

What is claimed is:

1. An optical head comprising:

a light source for emitting light; and

5 a reflection converging optical system which includes a solid immersion lens essentially made of a light-transmitting medium, and reflects said light emitted from said light source and taken in said solid immersion lens to converge said light onto a boundary portion of said solid immersion lens, said reflection converging optical system comprising:

10 a first reflection surface for reflecting said light that has been emitted from said light source and taken in said reflection converging optical system; and

a second reflection surface for further reflecting said light reflected by said first reflection surface and for converging said light onto said boundary portion of said solid immersion lens.

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2. The optical head according to claim 1, wherein

said light emitted from said light source is taken in said first reflection surface sideways with respect to a light-converging axis of said reflection converging optical system.

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3. The optical head according to claim 1, wherein

said first reflection surface and said second reflection surface are formed on a reflection member that is installed separately from said solid immersion lens.

25 4. The optical head according to claim 1, wherein

said first reflection surface is formed on a surface of said solid immersion lens, and

the second reflection surface is formed on a reflection member that is installed separately from said solid immersion lens.

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5. The optical head according to claim 1, wherein

said first reflection surface and said second reflection surface are formed on said solid immersion lens.

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6. The optical head according to claim 5, wherein

said solid immersion lens comprises: a bottom surface and an outer curved surface defining an outer shape thereof, and an inner curved surface that is placed inside said solid immersion lens,

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the inner curved surface having a reflection section serving as said first reflection surface,

the outer curved surface having a reflection section serving as said second reflection surface and an incident section for transmitting incident light onto said solid immersion lens;

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wherein said light that has been made incident on said solid immersion lens through said incident section is reflected by said first reflection surface placed on said inner curved surface, and further reflected by said second reflection surface placed on said outer curved surface, and then converged on a center area of said bottom surface.

7. The optical head according to claim 5, wherein

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the solid immersion lens has an upper surface and a bottom surface,

the upper surface has an incident section for transmitting incident light onto said solid immersion lens and a reflection section serving as said second reflection surface,

the bottom surface has a reflection section serving as said first reflection surface on a peripheral area of said bottom surface,

the incident section being placed on a peripheral area on said upper surface so that said light that has been made incident on said solid immersion lens through said incident section is reflected by said first reflection surface placed on said peripheral area of said bottom surface, and further reflected by said second reflection surface placed on a center area of said upper surface, and then converged on a center area of said bottom surface.

8. The optical head according to claim 7, wherein

the second reflection surface is formed on a cone-shaped concave section placed on said upper surface.

9. An apparatus for carrying out at least any one of recording, reproducing and erasing processes of information on a recording medium, comprising:

a) an optical head, said optical head including:

a-1) a light source for emitting light; and

a-2) a reflection converging optical system which includes a solid immersion lens essentially made of a light-transmitting medium, and reflects said light emitted from said light source and taken in said reflection conversion system to converge said light onto a boundary portion of said solid immersion lens, said reflection converging optical system comprising:

a-2-1) a first reflection surface for reflecting said light that has been emitted from said light source and taken in said reflection converging optical system; and

5 a-2-2) a second reflection surface for further reflecting said light reflected by said first reflection surface and for converging said light onto said boundary portion of said solid immersion lens; and

b) a signal processing section for processing a recording signal to said recording medium or a reproduced signal from said recording medium, through said optical head.

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10. The apparatus according to claim 9, wherein

said light emitted from said light source is made incident on said first reflection surface sideways with respect to a light-converging axis of said reflection converging optical system.

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11. The apparatus according to claim 9, wherein

said first reflection surface and said second reflection surface are formed on a reflection member that is installed separately from said solid immersion lens.

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12. The apparatus according to claim 9, wherein

said first reflection surface is formed on a surface of said solid immersion lens, and

the second reflection surface is formed on a reflection member that is installed separately from said solid immersion lens.

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13. The apparatus according to claim 9, wherein

said first reflection surface and said second reflection surface are formed on said solid immersion lens.

5 14. The apparatus according to claim 13, wherein

said solid immersion lens comprises: a bottom surface and an outer curved surface defining an outer shape thereof, and an inner curved surface that is placed inside said solid immersion lens,

10 the inner curved surface having a reflection section serving as said first reflection surface,

the outer curved surface having a reflection section serving as said second reflection surface and an incident section for transmitting incident light onto said solid immersion lens;

15 wherein said light that has been made incident on said solid immersion lens through said incident section is reflected by said first reflection surface placed on said inner curved surface, and further reflected by said second reflection surface placed on said outer curved surface, and then converged on a center area of said bottom surface.

15. The apparatus according to claim 13, wherein

20 the solid immersion lens has an upper surface and a bottom surface,

the upper surface has an incident section for transmitting incident light onto said solid immersion lens and a reflection section serving as said second reflection surface,

25 the bottom surface has a reflection section serving as said first reflection surface on a peripheral area of said bottom surface,

the incident section being placed on a peripheral area on said upper surface so that said light that has been made incident on said solid immersion lens through said incident section is reflected by said first reflection surface placed on said peripheral area of said bottom surface, and further reflected by said second reflection surface placed on a center area of said upper surface, and then converged on a center area of said bottom surface.

16. The apparatus according to claim 15, wherein

the second reflection surface is formed on a cone-shaped concave section placed on said upper surface.

17. A solid immersion lens that is a light-transmitting medium, comprising:

a first reflection surface for reflecting light taken in said immersion lens; and
a second reflection surface for further reflecting said light reflected by said first reflection surface and for converging said light onto said boundary portion of said solid immersion lens.

18. The solid immersion lens according to claim 17, wherein

said solid immersion lens comprises: a bottom surface and an outer curved surface defining an outer shape thereof, and an inner curved surface that is placed inside said solid immersion lens,

the inner curved surface having a reflection section serving as said first reflection surface,

the outer curved surface having a reflection section serving as said second reflection surface and an incident section for transmitting light taken in said solid

immersion lens;

wherein said light taken in said solid immersion lens through said incident section is reflected by said first reflection surface placed on said inner curved surface, and further reflected by said second reflection surface placed on said outer curved surface, and then converged on a center area of said bottom surface.

19. The solid immersion lens according to claim 17, wherein

said solid immersion lens has an upper surface and a bottom surface,

the upper surface has an incident section for transmitting light taken in said solid immersion lens and a reflection section serving as said second reflection surface,

the bottom surface has a reflection section serving as said first reflection surface on a peripheral area of said bottom surface,

the incident section being placed on a peripheral area on said upper surface so that said light taken in said solid immersion lens through said incident section is reflected by said first reflection surface placed on said peripheral area of said bottom surface, and further reflected by said second reflection surface placed on a center area of said upper surface, and then converged on a center area of said bottom surface.

20. The solid immersion lens according to claim 19, wherein

the second reflection surface is formed on a cone-shaped concave section placed on said upper surface.